ENVIRONMENTAL SENTINELS 2002

Envisioning the Future of Monitoring Technologies for the Space, Terrestrial, and Defense Environments

A two-day symposium to be held September 17-18 in Houston, Texas

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POINT OF CONTACT:
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http://advtech.jsc.nasa.gov/events_of_interest.asp

Symposium Objectives

Environmental Sentinels (ES) will focus exclusively on advanced technologies for monitoring physical, chemical, and microbial contaminants in the human environment, be it in a heavily populated urban area, an industrial site, the military theater, or the human-rated systems in the vast reaches of space. Despite different operational scenarios or uses, such monitoring technologies have overlapping value and are vital to human health, safety, and performance. For the future, we can imagine intelligent arrays of sensors that communicate wirelessly with a base station so they can warn and help localize problems before they spread. Such sensors would be sensitive to tiny quantities of a multitude of contaminants, thus permitting a timely response to avoid greater damage. The technologies presented here can help lead to that future.

As a result of ES 2002, we envision that the common needs and requirements of NASA, academia, other government agencies, and the military will be addressed and that further collaborations will result. By focusing on the most difficult problems facing us, such as:

- adequately and unobtrusively monitoring the crew compartment of a spacecraft,
- detecting minute quantities of chemical-biological warfare (CBW) agents in the homeland or in the battlefield,
- measuring pollutants in the atmosphere and water, and the
- intelligent processing and wireless transmission of such data,

we will ensure a lively discussion on the best technology solutions and aid in the identification of potential "just-over-the-horizon" technologies.

Furthermore, we would like to clearly differentiate this symposium from other large-scale conferences or scientific meetings. ES 2002 will be a small-scale (less than 90 attendees), tightly focused meeting, offering a more intimate opportunity to network with scientists, engineers, government program managers, and others who are not normally so easily available in one location.

NASA's Role in Environmental Monitoring

As NASA's Center of Excellence in Human Operations, the Johnson Space Center (JSC) cares for crewmembers before, during, and after a mission. A major component of this responsibility is ensuring that the crew environment is free from contaminants and that contamination, should it occur, can be instantly identified and localized. The technical needs for spacecraft environmental monitoring technologies are implicitly given at: http://www.jsc.nasa.gov/toxicology/, while advances in life support technologies are described at: http://advlifesupport.jsc.nasa.gov/. While JSC is responsible for specifying, developing and integrating monitoring technologies and systems for human spacecraft, it relies upon technologies developed by academia, other government agencies, and other NASA Centers under the Advanced Environmental Monitoring Technology program (see http://spaceresearch.nasa.gov/research_projects/ahst.html for details). Therefore, we seek strong representation from all NASA Centers, academia and government who contribute to this important area.

Likewise, we recognize the common needs of homeland defense, the military, and community safety organizations in the area of environmental monitoring. The future depends on our ability to defend our environment from attack. We seek strong representation from these communities, so that we can learn about and contribute to progress in the larger environmental monitoring community.

The government has invested large sums in technologies, resources, and skill sets, capabilities that might be integrated via collaboration on competitive, peer-reviewed research opportunities in the near future. In our most recent symposium, 92% of the participants who answered a post-event questionnaire (and nearly half of the attendees responded) indicated that they believed that new collaborations, along with some reinvigorations of old collaborations, resulted from contacts they had made at the symposium. If this symposium is equally successful, we expect excellent leveraging of skills and prior work will result and contribute to solving a multitude of technology needs for the future.

Symposium Details

1. **VENUE:** The venue for this symposium will be Regent's Park III (16850 Saturn Lane, Houston, TX), which can accommodate about 90 people. While this certainly limits the size of the symposium, the small size will permit the most interested people to join us and it has been our experience that groups of this size engage in much better networking and are more likely to form future collaborations than larger groups.

2. **AUDIENCE:** With space for approximately 90 people, we have attracted a very good mixture of participants from the following communities:
   - NASA personnel and contractors from several NASA centers
   - military personnel
   - other government agency and national laboratories personnel
   - academic faculty/personnel
   - graduate students

3. **ARCHIVE:** Because of the limited space available, we will record as many of the presentations at this symposium as possible (with the speaker's approval). Each recorded talk will be published as a streaming audio presentation on our Web site http://advtech.jsc.nasa.gov/presentation_portal.asp. About one-quarter of the streaming audio presentations from our previous symposium, Human Operations, are currently posted and more will come in the near future.

4. **COST:** There are **no registration fees!** However, we have **no funding to defray travel, meal, or hotel costs** for speakers or other participants. We will specify a nominal, voluntary contribution to cover refreshments, such as coffee, water, etc.

Dinner Presentation and Networking Opportunity

Franco's Italian Restaurant in Clear Lake (map to be provided; Dutch treat), Tuesday 9/17, 6:00 PM

"Space Flight Risk Assessment, Evidence-Based Medicine"
Jonathan Clark, M.D.
Chief Flight Surgeon
Manager for Mission Operations in the Space Medicine and Health Care Systems Office

Dr. Clark has been our most popular speaker at previous symposia.
Don't miss this eye-opening talk and the relaxed networking to follow!

Symposium Schedule

Time		Tuesday 9/17		Wednesday 9/18	
8:30	Overview of Govt Programs/Technology Needs	*Gather*	Current Solutions (technologies, etc.)	*Gather*	
9:00		Inserting New Environmental Sensing Technology into Flight Systems – Graf (NASA JSC)		Designing Signature Probes for Hybridization Arrays –Fox & Willson (U of H)	Laser Spectroscopy for Chemical Sensing Application – Koster (Rice University)
9:30		Advanced Life Support Overview – Speaker TBD (NASA JSC)		AquaSentinel™, A Photosynthetic Biosensor for Drinking Water – Greenbaum (ORNL)	Chemical Warfare and Toxic Ions Detection by Microcantilever Technology – Ji (LA Tech)
10:00		Research Requirements for Ensuring Cabin Environmental Quality – Whinnery (FAA)		Whole Cell Bioluminescent Bioreporters for Spacecraft – Ripp (UTenn-K)	Approaches to Air Quality Monitoring – Ryan (NASA JPL)
10:30		*Break*		*Break*	
11:00		NASA's Advanced Environmental Monitoring and Control (AEMC) Activities – *Jan (NASA JPL)*		Development of Plants as Sentinels for Pathogens – Tumlinson (USDA)	Integrating Microfluidic Devices and Bioreactors for Environmental Monitoring on Orbit – Culbertson (ORNL)
11:30		(1) Environmental Monitoring of Toxicants Based on Risk to Crew Health – James (NASA JSC) (2) Hardware Constraints For Space Flight – *Limero (NASA JSC)*		Rapid Identification of Microbes by Fluorescence PCR – McAvin (USAF)	Sensors and Control Systems for Bioreactors – Jeevarajan (NASA JSC)
12:00		*Lunch (1.5 hours)*		*Lunch (1.5 hours)*	
1:30		DARPA/DSO Programs in Tissue-Based Biosensors and Advanced Diagnostic Technologies – Cartledge (DARPA)		Oxide-based Sensors for the Rapid Detection of Bio/ Chemical Species – Gouma (SUNY)	Miniature Mass Spectrometer – Potember (JHU APL)
2:00		Microbial Monitoring of the International Space Station: Current Operations and Goals for the Future – Pierson & Ott (NASA JSC)		Laminar Flow Magnetic Separation – Weinstein (U of Houston)	Satellites as Sentinels for Environment & Health – Maynard (GSFC)
2:30		All Source Surveillance of Emerging Threats: Ocean-Based Microbes – Wong (SPAWAR)		Mid-infrared Optical Sensing for Chem/Bio Agent Detection – Le (U of Houston)	Developing The Electronic Tongue as a Water Quality Monitor – Buehler (JPL)
3:00		*Break*		*Break*	
3:30		EPA Interests: Current Challenges & Lessons Learned – Savage (EPA)		Miniature Quadrupole-Array & Paul Trap Mass Specs with GC Front End – Chutjian (NASA JPL)	Biomedical and Bioscience Applications of Microarray Technology – Tibbals (UTSW)
4:00		Miniature Mass Spectrometry, Microbore Capillary Column Gas Chromatography – Sinha (NASA JPL)		Environmental Data Acquisition, Positioning, and Telemetry System – Caputo (Brooks AFB)	Rapid, portable biosensor for multi-analyte sensing – Ligler (NRL)
4:30		DARPA BIOS program: Engineering Organisms for Use as Environmental Sentinels – Eisenstadt (DARPA)		Proteins and Cells in Hydrogel Microstructures: Applications in Sensing – Pishko (PSU)	Aerosol and Particulate Monitoring/Spacecraft Fire Safety –Greenberg (GRC)

INSTRUCTIONS FOR ALL ATTENDEES

Cancellations: We ask that attendees send a notice of cancellation as soon as they know they can't attend. We currently have a wait-list for presentations and will soon have one for attendance slots, so we need your cooperation on this.

Networking: A major goal of this symposium is to encourage networking. The group of 90 attendees is small enough that you should be able to meet virtually everyone whose interests might overlap with yours. We ask that all attendees try to stay for the whole symposium if possible. Good networking doesn't occur if you just show up to give or hear a presentation or two and then leave.

INSTRUCTIONS FOR PRESENTERS

Cancellations: We ask that presenters send a notice of cancellation as soon as they know they can't attend. We currently have a wait-list for presentations and will soon have one for attendance slots, so we need your cooperation on this.

Time: Each presentation is scheduled with precise start and end times, which can include a question and answer period at your discretion. Because some people may want to move between sessions, all talks will end on time and speakers will be asked to stop at the clock times listed.

Preparation: Please provide your presentation on CD-ROM or Zip-disk to the technical lead (David Kiss) **before** the day's sessions begin. He will be available at 8:00 am to load the presentations.

A very common problem is that CD-ROMs created on certain machines cannot be read on other machines, which forces us to re-master the disk on another computer. This can take an hour, so it is best to know at 8:00 AM if we are going to have a problem. In the past, those who have brought their own laptops have frequently found that the laptops are not compatible with our projectors and trying to work the problem can consume your presentation time.

Do not bring files on your own laptop or computer

The following hardware will be available at the facility:

Platform:	PC laptop*
	Multimedia projector
Operating system:	Windows 98 and higher
Supported media:	CD-ROM (PC-formatted)
	1.4 MB floppy disk (PC-formatted)
	Zip disk (PC-formatted)
Recommended file type:	PowerPoint, Office 98 or higher

*Viewgraphs are recommended only as a backup for the laptop and projector

Mac Operating Systems: If your presentation was created on a Mac OS, please save it to a PC-formatted medium or save it as a Windows 95 or higher file type. If you have questions about converting your files, please contact the technical lead, David Kiss (dkiss@futron.com or 281.333.0190 x16).

Connectivity: Security restrictions at the conference facility mean that Internet connectivity is very limited. If at all possible, HTML-based content should be saved to the recommended formats and viewed "locally" from the conference laptops.

Recordings*:* In lieu of a symposium CD-ROM or exhaustive conference report, we will record the audio of as many presentations as possible. These recordings will be synchronized with your slides and converted into streaming audio files that will be published online (see http://advtech.jsc.nasa.gov/presentation_portal.asp for examples). If you would like to have your presentation recorded, please complete and sign (electronic signature is acceptable) the approval form to be sent in a separate file; we will have these forms at the symposium as well.

Please contact the technical lead, David Kiss (dkiss@futron.com or 281.333.0190 x16), if you have any questions

List of Nearby Accommodations for Clear Lake Area

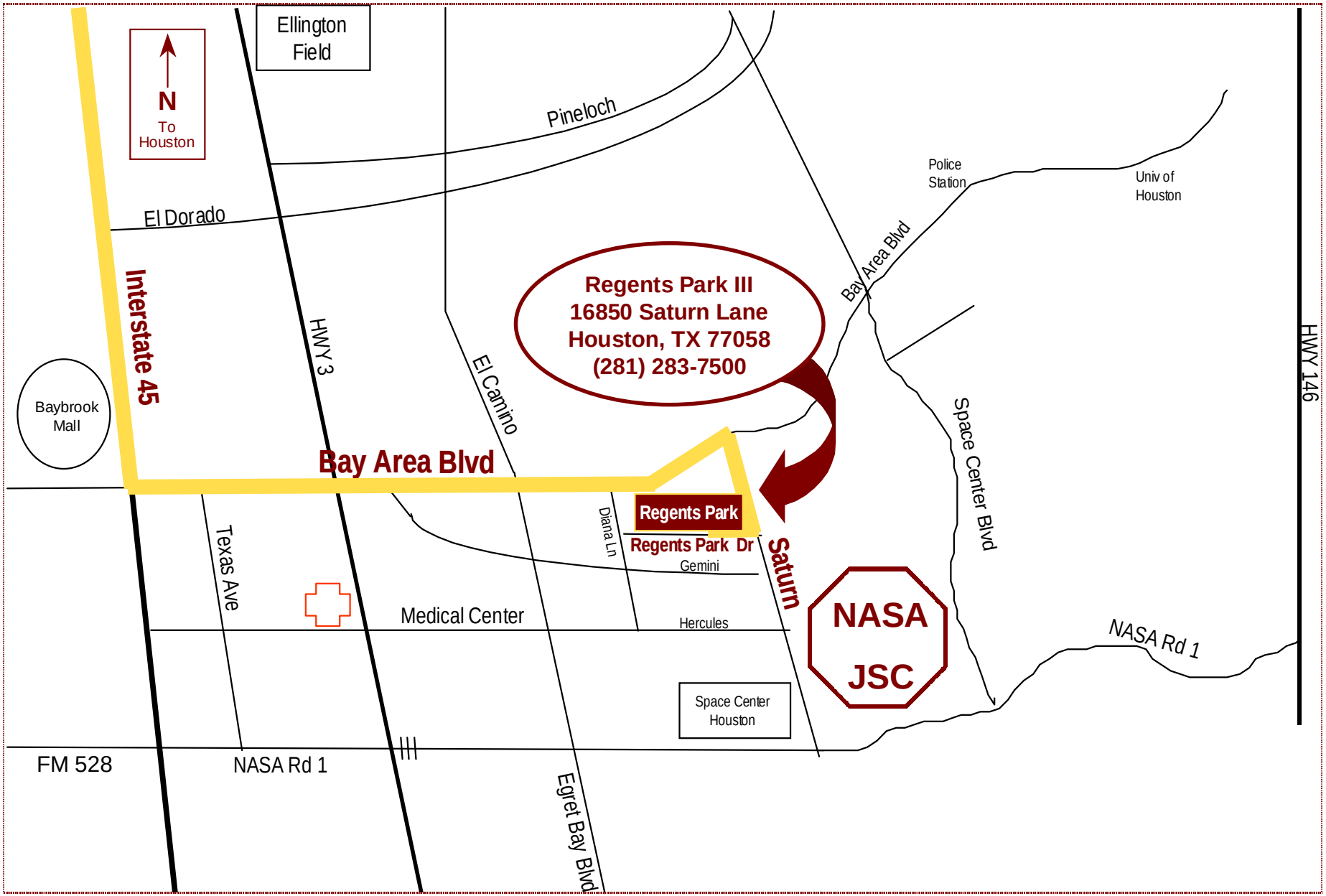
Location: **Regents Park III Conference Facility**, 2-3 miles from NASA JSC
16850 Saturn Lane
Houston, TX 77058
281-283-7500 (receptionist) and 281-283-7513 (fax)

Airports: Bush Intercontinental (IAH), approximately 40 miles from Clear Lake
Houston Hobby (HOU), approximately 15 miles from Clear Lake

HOTELS

Best Western NASA - Space Center	*281-338-6000*
Boardwalk Inn	*281-334-9880*
Candlewood Suites	*281-461-3060*
Comfort Inn-NASA / Houston	*281-332-1001*
Extended Stay America	*281-333-9494*
Fairwind Corporate Lodging	*281-488-4945*
Hampton Inn & Suites-Clear Lake/NASA	*281-332-7952*
Hilton Houston NASA Clear Lake	*281-333-9300*
Holiday Inn Express Hotel & Suites	*281-326-7200*
Holiday Inn - NASA	*281-333-2500*
Homewood Suites By Hilton	*281-486-7677*
Howard Johnson Express Inn & Suites	*281-316-2003*
Marina Park Inn	*281-334-4855*
Microtel Inn & Suites	*281-335-0800*
Motel 6	*281-333-4581*
Quality Inn - NASA	*281-333-3737*
Ramada Inn - NASA	*281-488-0220*
Residence Inn By Marriott	*281-486-2424*
Select Suites-NASA/Clear Lake	*281-338-9400*
South Shore Harbor Resort & Conference Center	*281-334-1000*
Suburban Lodge	*281-554-9552*
Super 8 Motel - League City	*281-338-0800*
Super 8 Motel - NASA	*281-333-5385*
Townplace Suites By Marriott	*281-286-2132*
Wellesley Inn & Suites	*281-338-7711*

Map of Regent's Park III and Surrounding Clear Lake



Logistics

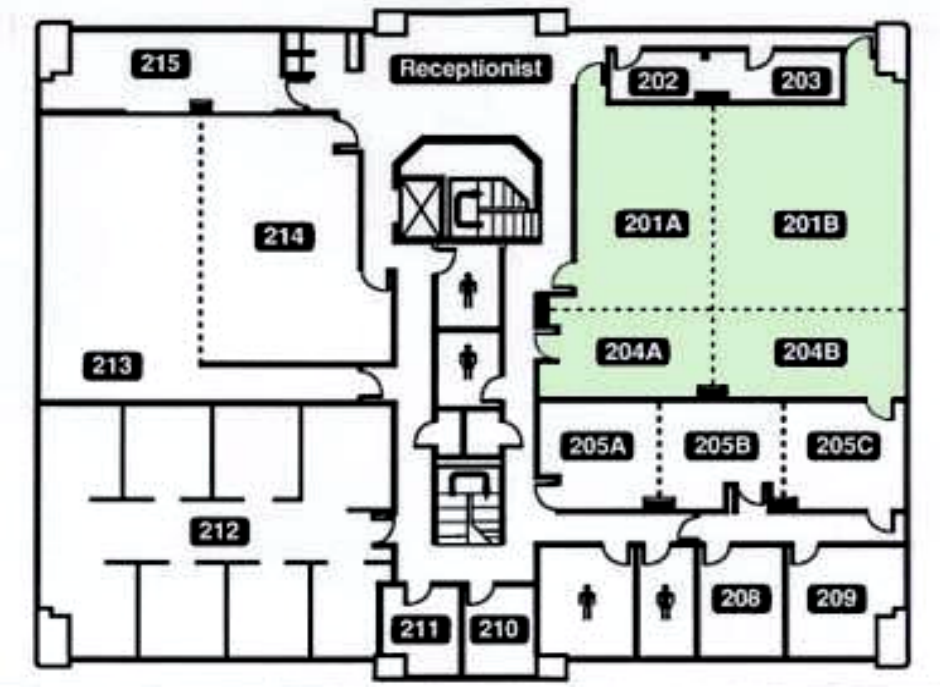
DIRECTIONS from Houston area airports and points north (refer to map on page 3)**:**

- From I-45 S towards Galveston take **Exit 26** for Bay Area Blvd (east/left), following signs to University-Houston Clear Lake and **not** to Baybrook Mall; remain on Bay Area for ~2.5 miles through numerous lights and 1 set of railroad tracks.
- Turn right (SE) on Saturn Lane at light and take second right onto Regent's Park Drive; the facility is the two-story mirrored building on right.

PARKING: Parking is available in front of (Saturn Lane entrance) and to the side of (Bay Area Boulevard side) Regent's Park III. Spaces reserved for local businesses are clearly labeled and should **not** be used by participants.

FACILITY: Conference facilities are located on the second floor of the building (see facility map below). Limited amenities such as telephone, fax, and computers are available.

Environmental Sentinels will be held in a suite of rooms, collectively labeled Room 201 (shaded area below).



BADGES: Regent's Park is not located onsite at JSC, meaning that no special badges are required.